

Dr Alexander Mikhalev

[Online CV](#) | [JSON-LD data](#)

Managing Partner and CTO | Applied AI and Autonomous Delivery

Swindon, United Kingdom

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Profile

Managing Partner, CTO and Head of AI combining technology direction with hands-on engineering in Rust, Python and TypeScript. Builds AI capability and the software platforms that put it to work: industrial monitoring and anomaly detection, knowledge search, client applications and autonomous engineering infrastructure. Experience spans startup team building, enterprise architecture at Nationwide and applied research at Cranfield. Leads delivery while remaining close to the code, data and engineering decisions.

Current leadership

Zestic AI

Managing Partner | CTO and Head of AI | July 2023–present

- Set technology direction and delivery approach across the client portfolio, combining hands-on platform engineering with reusable AI infrastructure and staged engineering reviews.
- Shape a services-and-platform strategy that turns client delivery into reusable capabilities; connect architecture choices, pilot scope and delivery priorities to the wider business model.
- **Confidential digital-learning provider:** lead architecture and engineering across assessment services, web applications and data models; implement assessment evidence handling, learner-journey testing, analytics instrumentation and CI/CD.
- **Confidential impact-finance lender:** engineer borrower workflows, financial assessment, document generation and CRM integration, bringing operational lending processes into a connected software platform.
- Build **TruthForge**, a Rust-based narrative-analysis application, with supporting deployment and website delivery.

Platforms built and operated

Terraphim AI

Architecture and hands-on development | Independent open-source platform

terrapih.ai

- Lead development of a Rust/WebAssembly knowledge-search platform combining role-specific knowledge graphs, deterministic text matching, command-line tools and Model Context Protocol integration.
- Build local-first, privacy-preserving search and context-engineering capabilities that connect domain knowledge, session history and reusable learning to AI tools.
- Develop Terraphim's distinctive graph-embedding approach in Rust, using curated concepts, synonym mappings and graph co-occurrence to rank documents and expose the relationships behind search results.

Autonomous delivery factory

AI Dark Factory and AgentForge

- Built and operate the AI Dark Factory, connecting issue prioritisation and agent execution with separate review, verification and validation gates across development projects.
- Extended AgentForge, a Gitea-based development platform, with scoped agent identity, signed audit events, a unified event stream and branch-based collaboration.
- Connected the development platform to a kanban workflow through a Rust bridge, making task coordination and review part of the engineering system.

Other concurrent appointments

Solutions Architect, InfynOn | Contract | December 2022–December 2023

Director, Applied Knowledge Systems | Self-employed | December 2022–present

Industrial AI leadership

Klarian

Chief Technology Officer | November 2023–June 2025

AI/ML Architect | December 2022–December 2023

- Led AI and technology development for industrial pipeline monitoring and analytics, combining engineering models and machine learning to investigate pump efficiency and equipment anomalies for UK pipeline operators.
- Co-authored published client case studies on pump-performance analysis and orifice-plate anomaly detection, connecting sensor data and physical behaviour to operational decisions.
- Co-authored analysis identifying potential energy-cost reduction of approximately **£5,000 per month per average mainline pump** in the examined network section, conditional on restoring efficiency to as-new levels.

Earlier leadership

Nationwide Building Society

Architecture and prototyping leadership | December 2014–December 2022

AI/ML Architect, January 2019–December 2022; Head of Prototyping Engineering, January 2018–January 2019; Solutions Architect, Accelerated Change Efficiency and DevOps, January 2017–January 2018; Tech Lead, December 2014–January 2017.

- Established and ran a prototyping engineering lab; developed distributed-infrastructure prototypes and contributed to AI and blockchain strategy. Sponsored and mentored the team member whose work resulted in a distributed-data-storage patent.
- Led teams of **2–12 technical architects** across parallel programmes including mobile banking, Open Banking, strategic origination, information management and regulatory change.
- Set technical quality assurance and governance for supplier designs and build deliverables, including IBM and Accenture; aligned project architecture with enterprise strategy and challenged technical debt.
- Led the **Synthetic Data Platform** from inception to enterprise capability to support data-driven innovation and reduce reliance on live data.
- Developed privacy-preserving machine-learning and digital-twin approaches.
- Shaped an enterprise DevOps blueprint and demonstrated architecture as code through a proof of concept; proposed a common business-value measure for change delivery.

M2M Ecosphere

Director of R&D | January 2019–January 2021 | Concurrent appointment

- Established innovation processes, an R&D ecosystem, knowledge management and organisation design to support innovation across Group Olvia.
- Deployed an AI prototype for the Group's copper supply chain from the Democratic Republic of the Congo to China, addressing route optimisation and response to unexpected disruption.

Shopitize

Head of Architecture and Development | November 2011–December 2014

- Served as the most senior technology professional, aligning business strategy, product development and platform architecture. Managed up to **32 engineers and designers across four locations**, then hired and built an in-house team.
- Designed and oversaw automated receipt processing using image processing and OCR; owned architecture spanning data processing, backend services, mobile APIs and a mix of public/private cloud infrastructure.
- Designed REST APIs, publish/subscribe processing and payment integrations with BACS and PayPal; built a product-matching search engine to replace Solr.
- Mentored data scientists and Science to Data Science participants.

Research and specialist delivery

Cranfield University

Research Fellow | May 2007–January 2012

- Developed wavelet-packet methods for mobile spectrum sharing and implemented the waveform on Anritsu vector signal generation and analysis hardware.
- Researched communications for in-vehicle sensor networks in an aerospace health-monitoring programme supported by an industry consortium led by Rolls-Royce and Boeing.
- Developed image-processing and data-fusion methods for emitter geolocation, comparing Hough-transform approaches with particle filtering in doctoral research.

Selected applied AI engagements

- **Memrise:** built a Java/Spark machine-learning pipeline for communications during a short specialist engagement.
- **ThirdEye:** developed a Kubernetes/TensorFlow pipeline for video recognition during a short specialist engagement.
- **Therapy Box:** developed a deep-learning speech-classification prototype for research into learning difficulties in children's speech.

IT/IS Executive | Microsharp Corporation | February 2003–May 2007

Designed and tested company IT and communications infrastructure with automation and redundancy.

Technical foundation

Platform engineering: Rust, Python, TypeScript, APIs, distributed systems, PostgreSQL, Redis, containers, CI/CD and Cloudflare Workers. Historical delivery also includes Java/Spark, TensorFlow, PyTorch and MATLAB.

Applied AI and systems: machine learning, NLP, knowledge graphs, graph embeddings, search, image processing, sensor fusion, privacy-preserving approaches and synthetic data. Systems engineering, technical architecture, prototyping and delivery governance connect the research and implementation work.

Patents

Secure distributed data storage | UK application GB1815423.7

Granted patent GB2574076B. Led the prototyping team and supported patenting; sponsored and mentored the named inventor.

Loyalty-program technology | Patent application WO2013057491

Named co-inventor of “Method and system for providing a loyalty program” for Shopitize.

Awards

- **Platinum Prize, Build on Redis Hackathon, 2021:** The Pattern, combining NLP-based document exploration, graph-based search and spatial VR/AR exploration.
- **Best Student Paper Award, ISSPA, 2007:** “Emitter Geolocation using fusion of TDOA Data with a Particle Filter”, co-authored with R. F. Ormondroyd.
- **Golden Award, Codility, January 2016:** Calcium2015 programming challenge.
- **Winner, Nationwide internal IT Architecture Raspberry Pi challenge, 2017:** machine-learning prototype for detecting data-compliance issues.

Selected talks

- **CNCF, 23 March 2023:** co-speaker, “Real-time pipeline monitoring for the energy sector”.
- **Oxford Praxis Forum, Green Templeton College, University of Oxford, 28 November 2022:** speaker, “What next after Google?”.
- **EuroPython, 28 July 2021:** co-presenter with Dvir Dukhan, “The Pattern: Machine Learning Natural Language Processing meets VR/AR”.
- **RedisConf, April 2021:** “Using the Redis ecosystem to build NLP-based services”; selected in Redis’s staff-voted conference highlights for “Best I-Can’t-Believe-You’re-Using-Redis-For-THAT Story”.

Competition projects and publication

MedGemma competition, February 2026: built a solo knowledge-grounded research prototype in Rust, including entity extraction, a knowledge graph, multi-agent orchestration, MedGemma integration and an evaluation harness; evaluated across 18 scripted cases with CPU/GPU inference.

Industrial publication: Co-author, *Monitoring and Anomaly Detection Approaches with AI and Data Analytics for Pipelines*, Pipeline Technology Journal, 2023.

Education

PhD | Cranfield University

Thesis: *Image processing and agent-based framework for the geolocation of emitters* (2010).

MSc | Bauman Moscow State Technical University

Computer Science and Computer Engineering.

TOGAF 9 Certified | The Open Group

Career themes

Digital twins and industrial AI

At Cranfield, researched in-vehicle sensor networks within a Boeing- and Rolls-Royce-backed Integrated Vehicle Health Management (IVHM) programme. This work connects to the sensor-data and modelling foundations of digital twins; later Klarian work applied physical models and machine learning to industrial monitoring.

Graph-based knowledge and grounded AI

The Pattern combined document exploration and graph-based search. Terraphim develops role-specific knowledge graphs and interpretable graph embeddings; the MedGemma research prototype brings knowledge graphs into a grounded AI workflow.

Privacy and enterprise AI capability

At Nationwide, led the Synthetic Data Platform from inception to enterprise capability and developed privacy-preserving machine-learning approaches. Terraphim continues the concern for data control through local-first search and context engineering.

From prototypes to autonomous delivery

Built prototyping capability and architecture-as-code demonstrations at Nationwide, then developed reusable delivery practices and an autonomous delivery factory connecting agent execution with separate review, verification and validation gates.